

TABLE 3.4
SUMMARY OF DATA QUALITY OBJECTIVES (DQO) PROCESS - SURFACE WATER INVESTIGATION
OU2 RI/FS WORK PLAN
SOUTH DAYTON DUMP AND LANDFILL SITE, MORaine, OHIO

Medium:		Surface Water	
Investigation Phase:		Phase 1A	Phase 1B
DQO Step	Investigation Item:	Comparison to Ambient Water Quality Criteria	Comparison to Upstream Conditions
			Quarry Pond Surface Water Sampling
1	State the Problem		
i) Problem description		Surface water samples have not previously been obtained from the Great Miami River (GMR) as it flows past by the Site. It is unknown whether and to what extent the Site has any measurable impact on water quality in the GMR. Intermittent drainage pathways and leachate seeps have not been identified at the Site to date.	Limited historic surface water samples have been obtained from the Quarry Pond (QP). Historic QP surface water samples did not contain any VOCs. No other parameters were assessed. The impact of Site contaminants on the QP is not known. Intermittent drainage pathways have not been identified at the Site to date.
ii) Planning team		See note at bottom	
iii) Conceptual model		<ul style="list-style-type: none">- Shallow groundwater from the Site typically flows towards the west and/or north towards the GMR, which could carry contaminants into its surface waters.- Erosion of surface soils from the Site could also carry Site-related contaminants to the GMR, which is at a lower elevation, via overland surface flow.- During flood events, any potential GMR contaminants originating off-Site could affect the Site.- Greater contaminant concentrations may be present at groundwater discharge points into the GMR and this will be investigated through sampling completed along transects.- Persons can come into contact with river water when using the river for recreation.- Wildlife and aquatic organisms are in contact with and ingest GMR water.	<ul style="list-style-type: none">- Shallow and deep groundwater from the Site typically flows towards the west towards the QP, which could carry contaminants into the QP.- During flood events, off-Site contaminants could be deposited in the QP.- Erosion of surface soils from the Site could also carry Site-related contaminants to the QP, which is at a lower elevation, via overland surface flow.- Persons can come into contact with pond water when using the pond area for recreation.- Wildlife and aquatic organisms are in contact with and ingest QP water.
iv) General intended use for data		The data collected will be compared against ambient water quality criteria to assess if human or aquatic ecosystem health is potentially impaired. In addition, CRA will visually inspect the bank of the GMR adjacent to the Site for evidence of leachate and/or runoff discharges potentially related to the Site (i.e., erosion rills, iron oxidation, turbidity, etc.). Sample locations will be matched up with Site discharges, if observed. The data collected will ultimately be used in the Baseline Risk Assessment for OU2.	The data collected will be compared against ambient water quality criteria to assess if human health or aquatic ecosystem health is potentially impaired. In addition, CRA will visually inspect the Quarry Pond embankments for evidence of leachate and/or runoff discharges (i.e., erosion rills, iron oxidation, turbidity, etc.). Sample locations will be matched up with Site discharges, if observed. The data collected will ultimately be used in the Baseline Risk Assessment for OU2.

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v) Resources, constraints, deadlines	Surface water quality and storm water runoff may be influenced by rainfall events, water temperature and other seasonal effects, which requires monitoring at different times of the year and under different conditions. Surface water sampling may not be possible during high flows. Surface water and storm water runoff sampling may not be possible during ice-cover conditions. Surface water sampling will be completed during low flow periods where contaminants entering via groundwater would present the greatest risks. Storm water runoff sampling will be completed following rainfall events should a significant runoff pathway be identified. Intermittent drainage pathways have not been identified at the Site to date.			

2 Goals of the Study:

i) Primary study question	Does surface water quality fail to meet ambient water quality criteria for protection of human health (direct contact, ingestion, and ingestion of aquatic organisms), and aquatic organisms?	Does the Site add contaminants to surface water in the GMR as it flows past the Site? If so, to what extent?	Does surface water quality fail to meet ambient water quality criteria for protection of aquatic organisms and human health (trespassers, recreational users and anglers)?
ii) Alternate outcomes or actions	- If sampling demonstrates that ambient water quality criteria are met, no further monitoring is planned. - If sampling demonstrates that criteria are not met, comparison with background conditions is warranted.	- If sampling demonstrates conditions adjacent to the Site are less than or equal to those found upstream, no further monitoring is planned. - If sampling demonstrates conditions are greater than upstream, and that contaminant concentrations are greater than Action Level criteria (see Phase 1A to left), further evaluation and/or control measures may be warranted.	- If sampling demonstrates that ambient water quality criteria are met, no further monitoring is planned. - If sampling demonstrates that criteria are not met, further evaluation and/or control measures may be warranted.
iii) Type of problem (decision or estimation) ¹	Decision (Action Level)		
iv.a) Decision statement	Determine whether any contaminants are present at concentration greater than ambient water quality criteria in the GMR as it flows past the Site.	Determine whether any measurable input of contaminants from the Site, relative to upstream conditions, occurs in the GMR as it flows past the Site.	Determine whether any contaminants are greater than ambient water quality criteria in the Quarry Pond.
iv.b) Estimation statement & assumptions	--		

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3 Identify Information Inputs:

i) Information types needed	Surface water sample analysis is required to assess conditions in the GMR as it flows past the Site.		Surface water samples are required to assess conditions in the Quarry Pond.
ii) Information Sources	New data from the investigation will form the basis of assessment.		New data from the investigation will form the basis of assessment.
iii) Basis of Action Level	Action Levels are: - Ambient water quality criteria (Ohio drainage basin) - Ohio EPA Aquatic Life and Human Health Tier 1 and II Values - USEPA RSL (tapwater) - USEPA National Recommended Water Quality Criteria for human health for consumption of water + organisms	The selected Action Level is a Background Threshold Value (e.g., 95th percentile) based on upstream conditions.	Action Levels are: - Ambient water quality criteria (Ohio drainage basin) - Ohio EPA Aquatic Life and Human Health Tier 1 and II Values - USEPA RSL (tapwater) - USEPA National Recommended Water Quality Criteria for human health for consumption of water + organisms
iv) Appropriate sampling & analysis methods	Methods are described in the Field Sampling Plan (CRA, May, 2013), CRA's Standard Operating Procedures, and the Quality Assurance Project Plan (CRA, September 2008). VOC samples will be collected using a peristaltic pump to minimize sample aeration while allowing for sample preservation. All other parameters will be sampled by directly dipping sample containers in the surface water body (GMR or Quarry Pond).		

4 Define the Boundaries of the Study:

i) Target population, sample units	The target population is all water flowing in the GMR as it flows past the Site. The sampling units are individual grab samples collected from the GMR, divided into upstream and near-Site reaches. The surface water sample locations will be adjusted based on the location of intermittent drainage pathways and GMR discharge points, if any are identified.	The target population is all water in the Quarry Pond. The sampling units are individual grab samples collected from the Quarry Pond. The surface water sample locations will be adjusted based on the location of intermittent drainage pathways and GMR discharge points, if any are identified.
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	ii) Specify spatial boundaries	In order to ensure that any potential contributions from nearby facilities (e.g. former GM-Delphi plant) are accounted for, CRA proposes to specify upstream sampling locations as those occurring to the east of Dryden Road, on the near-Site side of any dams. Near-Site sampling locations are those occurring to the west of Dryden Road (i.e., as surface water flows past the Site), and these will be located on the near (south/east) shore of the GMR. Due to the industrial activity in the area, chemical use and contaminants in the area may have been used by more than one facility. In order to establish whether contamination is or has resulted from Site activities, the background locations have been set close to the Site.		Spatial boundaries are the boundaries of Quarry Pond surface water.
	iii) Specify temporal boundaries	The temporal boundaries are defined by the duration of monitoring, which will occur over two sampling rounds		The temporal boundaries are defined by the duration of monitoring, which will occur over two sampling rounds.
	iv) Identify any other practical constraints	Sampling may be postponed due to flooding or iced conditions in the GMR. The outfall of the City of Dayton Waste Water Treatment Plant across the river GMR, just south of the downstream limit of the Site, may substantially impact downstream water quality, making any subsequent Site effects difficult to discern. If any dams/weirs are encountered, samples will be collected from the side of the dam closest to the Site (i.e., downstream of any upstream dams, and upstream of any downstream dams). Dilution of contaminants is likely towards the center and far bank of the GMR, and increases with distance downstream of the Site.		Sampling may be postponed due to flooding or iced conditions in the Quarry Pond.
v.a) Scale of inference for decision making		Comparisons to Action Levels will be carried out on an individual-location basis. For the RA, the 95% UCL of the mean concentration in an exposure unit will be used. A single exposure unit will be applied for the GMR.	Comparisons to upstream conditions will be carried out on an individual-location basis.	Comparisons to Action Levels will be carried out on an individual-location basis.
v.b) Scale of estimates		--		

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Develop the Analytic Approach:

i.a) Specify Action Level	- Ambient Water Quality Criteria - Ohio EPA Aquatic Life and Human Health Tier 1 and II Values - USEPA RSL (tapwater) - USEPA National Recommended Water Quality Criteria for human health for consumption of water + organisms	Background Threshold Values based on upstream data, following USEPA's ProUCL Technical Guide (2013)	- Ambient Water Quality Criteria - Ohio EPA Aquatic Life and Human Health Tier 1 and II Values - USEPA RSL (tapwater) - USEPA National Recommended Water Quality Criteria for human health for consumption of water + organisms
i.b) Specify estimator	--		
ii.a) Specify population parameter of interest and theoretical decision rule	Individual observations at near-Site sampling locations.		
ii.b) Specify estimation procedure	--		

6

Specify Performance or Acceptance Criteria:

i.a) Set baseline (null) and alternative hypotheses	Baseline H ₀ : surface water concentrations are less than Action Levels Alternative H ₁ : surface water concentrations are greater than Action Levels	Baseline H ₀ : near-Site surface water is no different than upstream Alternative H ₁ : near-Site surface water contains contaminant concentrations greater than upstream conditions	Baseline H ₀ : surface water concentrations are less than Action Levels Alternative H ₁ : surface water contaminant concentrations are greater than Action Levels
i.b) Specify how uncertainty accounted for in estimate	--		

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	ii.a) Determine impact of decision errors (false positives/negatives)	N/A: no statistical test is employed (direct comparison to Action Levels)	- If a false positive (Type I) error occurs, unnecessary additional investigation may occur. - If a false negative (Type II) error occurs, conditions that are not due to background conditions and that pose potential risk to aquatic ecosystem and/or human receptors could persist.	N/A: no statistical test is employed (direct comparison to Action Levels)
	ii.b) Specify confidence level for estimate	--		
	iii) Specify "gray region" for test	N/A: no statistical test is employed (direct comparison to Action Levels)	N/A: since comparing to maximum value, no statistical test is employed	N/A: no statistical test is employed (direct comparison to Action Levels)
	iv.a) Set tolerable limits on decision errors	N/A: no statistical test is employed (direct comparison to Action Levels)	The Background Threshold Values will be calculated using a 95 percent confidence level, making the false positive rate no greater than 5 percent. Since individual near-Site samples will be compared against background samples, the false negative rate will be controlled by two sampling events completed over the study period. An assessment of the decision performance curve achieved based on the monitoring data will be undertaken.	N/A: no statistical test is employed (direct comparison to Action Levels)
	iv.b) Specify performance or acceptance criteria	--		

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DQO Step				
7	<u>Develop the Plan for Obtaining Data:</u>			
	<div><div>i) Select sampling design</div><div>Near-Site samples will be collected close to the proximate (south/east) shore of the GMR, at the mid-point of the GMR at the upstream edge of the Site, and on the near-Site side of any dams; and at intervals of 800 ft (12 samples per event). Ten samples will be collected at regular intervals of 400 ft in each of two sampling events (22 samples total). Prior to surface water sample collection, a Site boundary visual inspection will be completed to identify any areas of discharge (i.e., rust stains, eddies, sediment, etc.) Surface water sampling will be collected during periods of GMR low-flow and the two sampling rounds will be completed at least three months apart.</div></div>	<div><div>Upstream samples will be collected at different locations, on the near-Site side of any dams, to provide a suitable data set (8-10 samples, per USEPA's ProUCL Technical Guide, 2013) for the calculation of Background Threshold Values. Near-Site samples will be collected along two three-point transects, upstream of the Site. Surface water sampling will be collected during periods of GMR low-flow and the two sampling rounds will be completed at least three months apart.</div></div>	<div><div>Prior to surface water sample collection, visual inspection of the Quarry Pond embankment will be completed to identify any areas of discharge (i.e., rust stains, eddies, sediment, etc.). Five samples will be collected at various points within the Quarry Pond in each of two sampling events (10 samples total). Two sampling rounds will be completed at least three months apart.</div></div>	
	<div><div>ii) Specify/evaluate key assumptions supporting the design</div><div>Mixing in the GMR is expected to be reasonably complete over the travel length of the GMR (greater than one mile) adjacent to the Site. Sampling at key locations (upstream edge, mid-Site, upstream of the WWTP, and downstream) will represent the range of ambient conditions in surface water.</div></div>	<div><div>The calculation of Background Threshold Values (statistical limits on an upper percentile, e.g. 95th) for the upstream population of surface waters depends on data characteristics (e.g., distribution and proportion of detected values), as fully discussed in the USEPA ProUCL Technical Guide (2013). Additionally, the presence of outlying values will be tested, and if present their impact on the values obtained evaluated.</div></div>		

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Notes:

- [1] If investigating a "decision problem", follow items ending in ".a" in subsequent DQO steps (e.g., "ii.a" or "iii.a").
If investigating an "estimation problem", follow ".b" items.
Once the baseline risk assessment for OU2 has been performed, possible remedial goals (PRGs) will be derived from the calculator using site-specific risks.

-- Item not applicable for the type of problem (decision vs. estimation) investigated.

The planning team includes:
Respondents: Ken Brown (ITW); Jim Campbell (ITW); Bryan Heath (NCR); Wendell Barner (TRW)
Steve Quigley (CRA Project Director); Adam Loney (CRA project manager);
Wesley Dyck, Daniela Araujo (CRA statistics expert);
April Gowing, Steve Harris, Vincent Nero and Dan Smith (CRA risk assessment experts);
Paul Wiseman, Rawa Fleisher, Angela Bown (CRA chemists/quality assurance staff);
Julian Hayward, Valerie Chan (CRA project engineers); Mark Hilverda (CRA project hydrogeologist);
Leslie Patterson (USEPA Regional Project Manager); Maddie Smith (Ohio EPA representative); and property owner stakeholders.